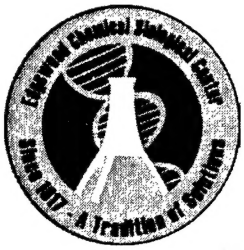

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CHEMICAL BIOLOGICAL CENTER

U.S. ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND

ECBC-TR-370

SWATCH TEST RESULTS OF DURACLEAN® WITH LYCRA® COMMERCIAL CHEMICAL PROTECTIVE GLOVES TO CHALLENGE BY CHEMICAL WARFARE AGENTS

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Swatches from Wilshire Technologies, Incorporated (Carlsbad, CA), Duraclean® with Lycra® gloves were challenged with liquid droplets of sarin (GB) and mustard (HD) using modifications of the static diffusion procedure described in TOP 8-2-501. The cumulative mass of each agent that permeated each swatch was determined over time, and the results for all swatches were used to determine an average cumulative mass for the gloves. From these data, a breakthrough time was calculated for each glove/agent combination for comparison purposes.

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EXECUTIVE SUMMARY

As part of the Domestic Preparedness Program, Wilshire Technologies, Incorporated (Carlsbad, CA), Duraclean® with Lycra® gloves were tested to assess their capability to protect in a chemical warfare (CW) agent environment. Swatches of material from the gloves were tested for resistance to permeation for sarin (GB) and mustard (HD). From these data, the authors calculated the estimated time it would take to permeate the gloves with sufficient agent to cause physiological effects in a person wearing the gloves. The tests are described and the calculated breakthrough times are presented.

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PREFACE

The work described in this report was authorized under the Expert Assistance (Equipment Test) Program for the U.S. Army Edgewood Chemical Biological Center (ECBC) Homeland Defense Business Unit. The work started in April 2003 and was completed in June 2003.

The use of either trade or manufacturers' names in this report does not constitute an official endorsement of any commercial products. This report may not be cited for purposes of advertisement.

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The authors acknowledge Frank DiPietro for managing the equipment acquisition and test scheduling necessary to accomplish the testing in a timely manner.

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SWATCH TEST RESULTS OF DURACLEAN® WITH LYCRA® COMMERCIAL CHEMICAL PROTECTIVE GLOVES TO CHALLENGE BY CHEMICAL WARFARE AGENTS

1. INTRODUCTION

In 1996, Congress passed Public Law 104-201 (Defense Against Weapons of Mass Destruction Act of 1996), directing the Department of Defense (DoD) to assist other federal, state, and local agencies in enhancing preparedness for terrorist attacks using weapons of mass destruction. The DoD responded by forming the Domestic Preparedness Program that same year. One of the objectives of the Domestic Preparedness Program was to enhance emergency and hazardous material response to nuclear, biological and chemical (NBC) terrorism incidents. As part of an effective response, people who are responding to an incident will use personal protective equipment to protect them from exposure to chemical or biological agents. The specific personal protective equipment (PPE) that will be used depends upon the situation that they encounter and what they have on hand. In some cases, chemical protective gloves may be required to enter either a contaminated or potentially contaminated area.

2. OBJECTIVES

This study evaluated one common and commercially available glove design to assess how well it resisted vapor permeation from liquid contamination[1] by chemical agents Sarin (GB) and mustard (HD). This information is intended for federal, state and local emergency and HAZMAT personnel as an aid in their evaluation (and possible modification) of current work rules regarding specific chemical protective gloves currently in inventory, and as an aid in future procurement of appropriate chemical protective gloves. This is especially important if these personnel choose to include military chemical and biological agent protection as a criterion. The information supplements data and information provided by the glove manufacturers. The gloves were tested in new, as-received, condition. The effects of aging, temperature extremes, laundering, and other factors are beyond the intended scope of this test program. These tests were conducted to assess percutaneous (i.e., skin) protection only.

3. TESTING AND DATA ANALYSIS

3.1 Testing Overview.

The Duraclean® with Lycra® glove was manufactured by Wilshire Technologies, Incorporated (Carlsbad, CA). The label stated the glove was 100% polyurethane and was white in color. The part number was 13033-2. Figure 1 is a digital photograph of the glove label. Figure 2 is a digital photograph of the glove in its packaging. Tests included the measurement of permeation of GB and HD through material swatches.

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[1] Throughout this report, the term permeation is used even though for some of the tests, the precise mechanism of agent transfer is not determined, and penetration is possibly also involved.

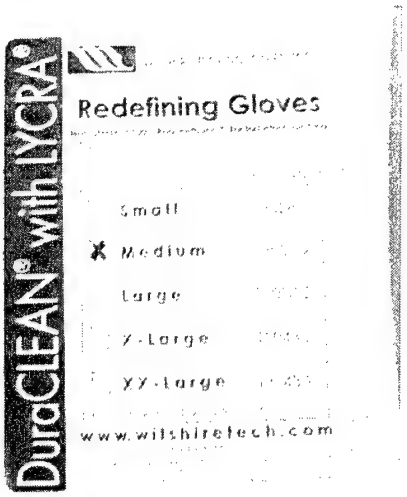

Figure 1. Duraclean® with Lycra® Glove Label

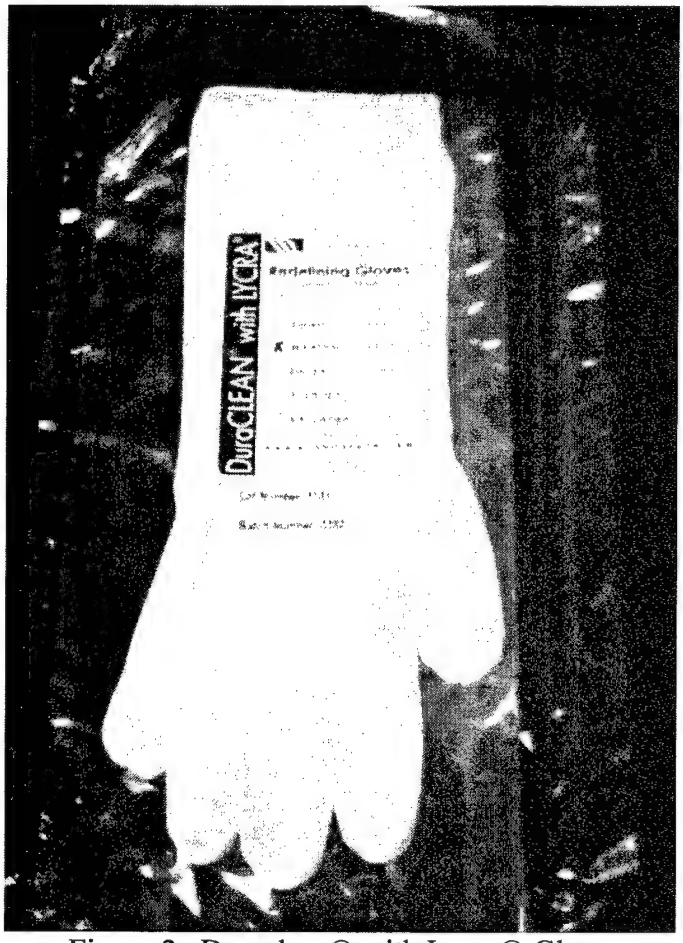

Figure 2. Duraclean® with Lycra® Glove

3.2 Liquid Challenge/Vapor Permeation Testing (Agent Swatch Testing).

3.2.1 Liquid Challenge/Vapor Permeation Testing Procedures.

This testing was conducted to measure the permeation of chemical agents GB and HD through glove swatches over a 24-hr period. The test was intended to assess how well the glove materials resist agent permeation. The amount of agent applied and duration of exposure do not represent any particular threat that responders may encounter, but they do serve as a common point of reference for all test results. The testing was performed by the Applied Test Team, Research and Technology Directorate, U.S. Army Edgewood Chemical Biological Center (ECBC).

Test Procedure.

The test methodology was taken from TOP 8-2-501[2] and is described in Appendix A. Twelve swatches were cut from three pairs of the glove design to be tested. Six of the twelve swatches were cut from the palm, and six were cut from the cuff. Swatches were taken from approximately the same locations for all gloves - from the center of the palm and from the cuff area near the end of the glove. Three of the palm swatches and three of the cuff swatches were allocated to GB testing, and the remainder were allocated to HD testing. In the analysis, the palm swatch was assumed to represent the palm, fingers, and back of the hand; and the cuff was assumed to represent the remainder of the glove that covers the wrist and forearm area. Swatch thicknesses were measured with an Ames Dial Comparator, Model 2 (B. C. Ames Company, Waltham, MA). Five readings per swatch were taken and averaged to yield an average thickness for each swatch. The individual thickness readings for all swatches were then used to calculate the average swatch thickness in mils. Results are shown in Table 2. For each test; six test swatches were placed in six test cells. Figure 3 is a digital photograph of the test cell used. Laboratory personnel applied a predetermined liquid agent challenge (10 g/m^2) to the top surface of each swatch; droplet application to the surface of the first swatch was at time zero. Agent droplets were applied to the surface of the first swatch at time zero. Agent was then applied to the surface of each succeeding swatch at roughly 1-min intervals. The upper chamber of each test cell was sealed. The test cell was then placed into a TOP permeation test apparatus with system control and data acquisition system, fabricated by Battelle Memorial Institute (Columbus, OH). A digital photo of the permeation apparatus is shown in Figure 4. The test cell inlet was connected to the manifold from which clean air at the test conditions was drawn. The test cell outlet was connected to the vacuum source whose flow rate was metered by a mass flow controller. Thus, a 1.0 L/min flow of air was maintained in the lower test cell chamber beneath each swatch.

During the 24-hr test period, gas samples were taken on a sequential basis by a laboratory MINICAMS™ (OI Analytical, CMS Field Products Group, Birmingham, AL) with stream selection system (a miniaturized gas chromatograph (GC) with flame photometric detector and sampling system) from the airstream beneath each swatch (Figure 5). Air Sampling by the MINICAMS™ began for the first swatch approximately 6 min following agent

[2] Test Operations Procedure (TOP) 8-2-501, Permeation and Penetration of Air-Permeable, Semipermeable and Impermeable Materials with Chemical Agents or Simulants (Swatch Testing). U.S. Army Dugway Proving Ground, UT. 3 March 1997, UNCLASSIFIED Report (AD A322329).

application. For HD, subsequent 3-min cycles of the MINICAMS™ were composed of 2.5 min of desorption of collected agent vapor from the pre-concentrator tube (PCT) onto the GC column followed by 0.5 min of gas sampling (collection of agent vapor in the PCT). For GB, subsequent 2.5-min cycles of the MINICAMS™ were composed of 2 min of desorption followed by 0.5 min of gas samples. Sampling was done sequentially through the six test swatches (three each from two separate sampling areas). The sampling sequence was then repeated. Each test swatch was sampled approximately once every 15-18 min. Prior to running the test swatches, a set of six silicone swatches was run against each agent (one each 1 μL droplet was applied to the surface of each swatch) to insure that the test setup was running properly. In addition, a 2-hr HD trial run was conducted with three glove swatches to assess the magnitude of permeation and for further assurance that the MINICAMS™ system was operating properly.

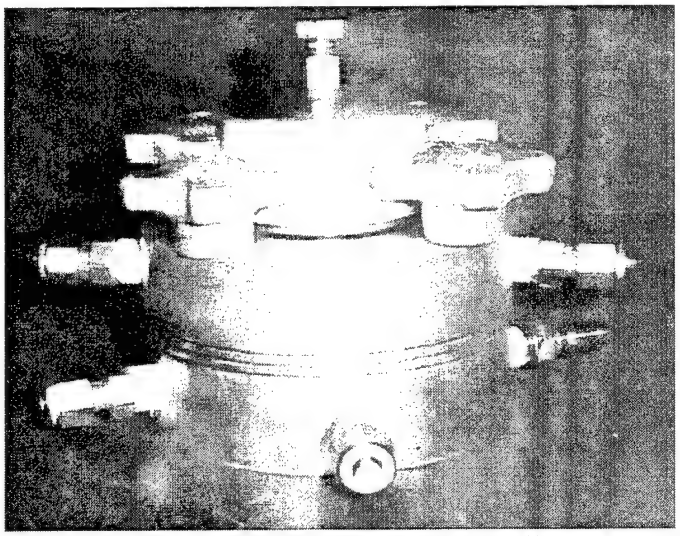

Figure 3. TOP Permeation Cell

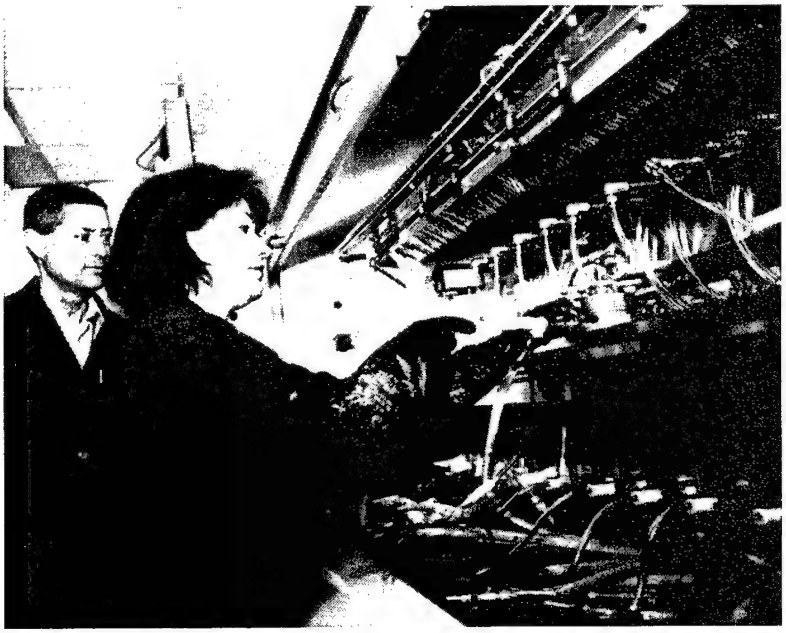

Figure 4. TOP Permeation Apparatus

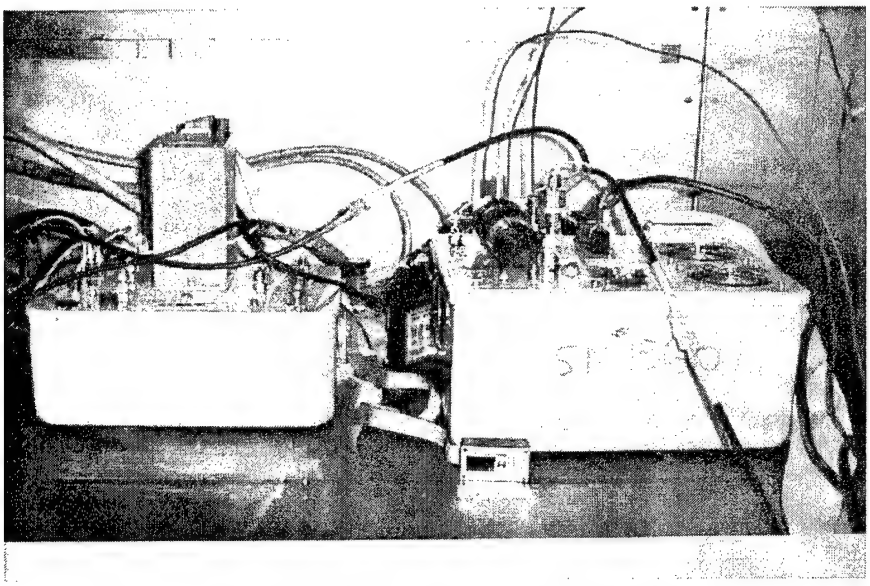

Figure 5. MINICAMS™ and Stream Selection System

The MINICAMS™ first determined the amount of agent vapor in each gas sample. Using this result, the amount (ng) of agent vapor present in the airstream that passed beneath the swatch over the time from the previous gas sample to the current gas sample was determined by the MINICAMS™ permeation software. The calculations assumed that the permeation rate is constant such that the mass permeating increases linearly over the 15-18 min interval. The permeation for each time interval was the average of the permeation rates (flux, ng/cm^2 /min) for the current and previous gas samples multiplied by either 15 or 18 min. This amount of agent vapor per unit area was presumed to be the amount of agent vapor per unit area that had permeated the swatch over that time interval. The cumulative mass of agent permeating the swatch per unit area at any elapsed time during the 24-hr test was defined as M_f. It was based on the mass permeated in the time interval over the effective swatch area, which was the opening in the permeation cell (10 cm^2), and was determined by the MINICAMS™ permeation software. Over the 24-hr test period, a series of M_f values was calculated for each swatch.

3.2.2 Liquid Challenge/Vapor Permeation Testing Analysis.

The glove had M_f data for six swatches for each of the two agents over the 24-hr test period. The M_f data were taken for each of the three swatches from one sampling area tested with one of the agents. For this report, the average (of three swatches) cumulative permeation (M_f) was calculated. This average was then presented, at each of the reported elapsed times, as representative of the glove's permeation resistance at that sampling area. The reported elapsed time for each sampling area was the average of the elapsed times for the three swatches.

To estimate M_f at each elapsed time for a glove, the simplifying assumption was that the exposure was uniform over the entire glove, and that the glove permeated in a way that is representative of the two sampled sites. This permitted the determination of an average M_f at each average elapsed time. The average elapsed time was the sum of the reported elapsed times

for both sampling areas divided by two. The palm and cuff surface areas of the gloves were assumed to be equal. The average M_f at any average elapsed time was calculated using the following equation:

$$\text{Average } M_f = [(\text{palm material } M_f) + (\text{cuff material } M_f)]/2 \quad (1)$$

3.2.3 Relationship Between Liquid Challenge/Vapor Permeation Test Results and Skin Exposure.

The permeation test was designed to distinguish among material swatches according to their permeation resistance to chemical agents. It was not intended to specifically replicate threat scenarios that may be encountered in actual use. As previously reported by Belmonte,[3] it was instructive to estimate the agent dosage ($C_i t_{skin}$) that would result from such a standard agent challenge as a relative indication of possible physiological effects. This was done by converting the average M_f values to equivalent agent dosages. This relationship was developed by Fedele (written communication, Dr. P. Fedele, R&T Directorate, ERDEC, July 1997) and was reported by Belmonte.[3] For air-impermeable glove materials, the only mechanism for removal of agent vapor that permeates the barrier was assumed to be its permeation through the skin, so the equation is:

$$\text{Agent Dosage } (\text{mg - min/m}^3) = \frac{M_f\ (\text{ng/cm}^2)}{\text{Permeability of skin to agent vapor (cm/min)}} \quad (2)$$

where skin permeability is 2 cm/min for HD and 0.1 cm/min for GB. The agent dosage was then compared to doses that are known to cause certain levels of toxicity. It was assumed that skin permeabilities of HD and GB are roughly constant over the entire body.

3.2.4 Evaluation Criteria for Liquid Challenge/Vapor Permeation Test Results.

When analyzing the test results, it was useful to determine whether the data indicate that the chemical protective glove provides percutaneous protection over some period of time. Mustard vapor can produce erythema (reddening of the skin) at dosages of approximately 1039 mg-min/m^3 on the backs of the hands. It can produce vesication (skin burns and blisters) at 2078 mg-min/m^3 on the backs of the hands. It was assumed that the hands were protected by the test gloves and challenged uniformly by the liquid dose used on the swatches. Using the threshold skin reddening dosage, and the skin permeability for mustard and substituting values in Equation 2, we obtained the HD threshold M_f value

$$\text{Threshold } M_f = 2 \text{ X } 1039 = 2078 \text{ ng/cm}^2 \quad (3)$$

Sarin vapor can produce incapacitation at percutaneous dosages of approximately 8000 mg-min/m^3 and can cause lethality at dosages of 15000 mg-min/m^3 where exposed persons are healthy, young, fit, and well-nourished males of approximately 70-kg mass. People who are

[3] Belmonte, Richard B. *Test Results of Level A Suits to Challenge by Chemical and Biological Warfare Agents and Simulants: Summary Report*; ERDEC-TR-513; U. S. Army Edgewood Research, Development and Engineering Center: Aberdeen Proving Ground, MD, 1998; UNCLASSIFIED Report (AD-A353 013).

smaller, less fit, etc., may exhibit adverse effects at lower doses ($C_i t_{skin}$). Unlike mustard, Sarin acts systemically: the body reacts to the total amount of Sarin absorbed by the body. For this analysis, it was assumed that the gloves were incorporated into a full ensemble protecting the entire body, but that only the gloves were challenged by liquid agent. The amount of Sarin agent per unit area (average M_f) necessary to permeate glove material covering the hands and forearms and produce a predetermined systemic effect was estimated by using the whole body dosage threshold of incapacitation (8000 mg-min/m^3), the skin permeability to Sarin agent (0.1 cm/min) from Equation 2 and 8.41% as the fractional area (proportion of the total body area represented by the hands and forearms in the BRHA model).[4] The relationship is:

$$\text{Threshold } M_f = (\text{Threshold dose X skin permeability})/(\text{fractional area}) \quad (4)$$

Substituting,

$$M_f = (8000 \times 0.1)/(0.0841) = 9{,}512 \text{ ng/cm}^2 \quad (5)$$

The above values were used in the graphs of average M_f versus time and were summarized in Table 1. A physiologically derived breakthrough time was the time when the average M_f equals the breakthrough M_f criterion.

Table 1. Agent Breakthrough Criteria

Agent	Threshold Dosage (mg-min/m^3)	Physiological Effect	Skin Permeability, P_s (cm/min)	Threshold, M_f (ng/cm^2)*
HD	1,039	Erythema	2	2,078
HD	2,078	Vesication	2	4,156
GB	8,000	Incapacitation	0.1	9,512
GB	15,000	Lethality	0.1	17,836

* These breakthrough criteria are not to be construed as safe threshold values, they are being used only to rank gloves.

4. RESULTS AND DISCUSSION

The physiologically derived breakthrough times and average swatch thicknesses are presented in Table 2.

[4] Fedele, Paul D., Nelson, Douglas, C. *A Method of Assessing Full Individual Protective System Performance Against Cutaneous Effects of Aerosol and Vapor Exposures*, U.S. Army Edgewood Research, Development and Engineering Center: Aberdeen Proving Ground, MD, 1995; Section 1-3 "Body Region Hazard Analysis Process." In the report for the JSLIST Program: Cronin, Tracy D., *Final Report for the Development of the Man-In-Simulant Test (MIST) Methodology for Evaluation of Chemical/Biological (CB) Protective Garments*, TECOM Project No. 8-EI-825-ABO-004, U.S. Army Dugway Proving Ground: Dugway, UT, April 1996.

Table 2. Swatch Test Results

Item	Average Swatch Thickness, mils	Physiologically Derived Breakthrough time, min	
		HD	GB
Duraclean® with Lycra®	5	5	14

The MINICAMS™ minimum detection limit for HD was 21.0 ng for all tests and the detection limit for GB was 1.0 ng for all tests. The material bubbled as GB droplets were applied, but there were no visible effects on any of the materials from either HD or GB exposure at the test conclusion. Physiologically derived breakthrough times should only be used to compare glove materials. Overall test results are presented in Appendix B. The HD average M_f data are presented in Table B-1, and the GB average M_f data are presented in Table B-2. The HD individual swatch data are given in Table B-3, and the GB individual swatch data are given in Table B-4. The HD trial run data are given in Table B-5. The HD silicone swatch trial data are shown in Table B-6, and the silicone swatch trial data are shown in Table B-7. The plot of the average HD permeation is shown in Figure B-1, and the plot of average GB permeation is shown in Figure B-2. The plot of HD permeation by sampling area is shown in Figure B-3 and the plot of GB permeation by sampling area is shown in Figure B-4.

5. CONCLUSIONS

The test data revealed that the Duraclean® with Lycra® glove provides minimal protection from liquid CW agents. Physiologically derived breakthrough time should not be interpreted as the time that a glove can be safely worn, either for HD or GB. These times should only be used to compare glove materials.

ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
Ct	Vapor exposure, product of vapor concentration (mg/m^3) and time (min)
C_1t_{skin}	Vapor exposure to skin
cm^2	Square centimeters
CW	Chemical warfare
°F	Temperature in degrees Fahrenheit
DoD	Department of Defense
ECBC	U.S. Army Edgewood Chemical Biological Center
g	Gram
GB	Sarin, Isopropylmethylphosphonofluoridate
GC	Gas chromatograph
HD	Sulfur Mustard; 2,2'-Dichlorodiethylsulfide
hr	Hour
in	Inch
kg	Kilograms
L	Liter
M_f	Cumulative mass permeation through the fabric (ng/cm^2)
m^2	Square meters
m^3	Cubic meters
mg	Milligram
min	Minute
µL	Microliter
ng	Nanogram
NBC	Nuclear, Biological and Chemical
ND	Non-detectable
NR	Not Reported
PCT	Pre-concentrator tube
PPE	Personal Protective Equipment
P_s	Skin permeability
RH	Relative Humidity
TOP	Test Operations Procedure

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APPENDIX A

MODIFIED STATIC DIFFUSION TEST PROCEDURE

MODIFIED STATIC DIFFUSION TEST

This test procedure was adapted from Test Operations Procedure (TOP) 8-2-501, Permeation and Penetration of Air-Permeable, Semipermeable and Impermeable Materials with Chemical Agents or Simulants (Swatch Testing). U.S. Army Dugway Proving Ground, UT. 3 March 1997, UNCLASSIFIED Report (AD A322329). The test procedure was entitled "Semipermeable and Impermeable Materials Static Diffusion Penetration Testing (Liquid Agent Challenge/Vapor Penetration; delta p = 0, Single Flow Test)." The following procedure was used:

1. Upon receipt of the gloves, all available information concerning the gloves will be recorded; date of manufacture, lot number, serial number, materials of construction, etc.

2. From each pair of gloves, one each 1 and 15/16 in. diameter material swatch will be taken from the cuff area for HD and one like-sized material swatch will be taken from the cuff area for GB. From the same pair of gloves, one each 1 and 15/16 in. diameter material swatch will be taken from the palm area for HD and one like-sized material swatch will be taken from the palm area for GB. Swatches will be taken from at least three pairs of gloves (a minimum of six HD swatches and six GB swatches will be tested) for each glove model/style. Thickness measurements will be taken and recorded for each swatch. Each swatch will be placed in an airtight bag and given a unique serial number, which will be placed on the bag. A list of serial numbers will be kept with the swatches.

3. The environmental chamber will be controlled at a temperature of 90 ± 2 °F (32.2 ± 1 °C) and the maximum achievable relative humidity (RH) without occurrence of condensation (60 ± 10% RH). The temperature and RH readings will be checked weekly with a calibrated meter. The test cell air will be drawn from the chamber air. [TOP 8-2-501 specifies that a system control and data acquisition system will be used; but, this system was not used due to budget constraints.] The temperature and RH will be recorded in a computer file. Flow rates will be manually recorded. [TOP 8-2-501 specifies that differential pressure monitoring will be done; but, differential pressure gages were not used due to budget constraints.]

4. The TOP test cell will be used. When assembling, the cell lugs will be tightened by hand to finger tight. The flow rate beneath each swatch will be 1 L/min, which will be controlled by a linear mass flow controller. The flows will be checked with a calibrated test meter weekly. Each test cell will be checked for leaks after assembly by connecting it to the vacuum source and checking that the inlet flow is the same as the outlet flow on the mass flow controller (cell lugs will be retightened if flows don't match).

5. The swatches will be preconditioned overnight in the environmental chamber. Eighty-mil silicone will be used as an indicator swatch to verify that the MINICAMS can detect agent vapor permeation (one silicone swatch per six glove swatches). [TOP 8-2-501 specifies that positive control and negative control swatches will be used; but, they were not used due to budgetary and schedule limitations.]

6. Agents GB and HD will be used. The contamination density will be 10 g/m^2 (eight 1 μL HD droplets or ten 1 μL GB droplets). The agent will be applied using the click/touch method with a Hamilton repeating dispenser. [TOP 8-2-501 specifies that a robotic agent application system will be used for agent application; but, this was not done due to budget constraints.]

7. Seven swatches will be tested at once. MINICAMS with a stream selection system will monitor vapor permeation with a 3-min cycle per swatch. There will be three blank sampling intervals following the indicator swatch. Each swatch will be sampled once every 30 min. The MINICAMS will be standardized weekly.

8. The test length will be 24 hr.

9. The test cells and o-rings will be aerated between uses. No other cleaning method will be used.

10. The data to be reported are cumulative permeation (ng/cm^2) versus elapsed time from contamination (min) for each swatch. All recorded data will be placed in laboratory notebooks, and a technical report will be drafted at the conclusion of this effort.

APPENDIX B

OVERALL TEST RESULTS

Table B - 1.

Average HD Permeation					
Time (min)	M_f, Palm (ng/cm^2)	Time (min)	M_f, Cuff (ng/cm^2)	Average Time (min)	Average M_f (ng/cm^2)
8	2468	11	5446	10	3957
26	15077	29	24140	28	19608
44	32223	47	47414	46	39819
62	52633	65	74272	64	63452
80	75419	83	103263	82	89341
98	99665	101	133137	100	116401
116	124420	119	164004	118	144212
134	149694	137	195564	136	172629
152	175274	155	226634	154	200954
170	200754	173	256958	172	228856
188	225980	191	286617	190	256299
206	250369	209	315435	208	282902
224	273819	227	343053	226	308436
242	296291	245	369477	244	332884
260	318040	263	394740	262	356390
278	339234	281	418723	280	378978
296	359601	299	441616	298	400609
314	379620	317	462528	316	421074
332	398346	335	481902	334	440124
350	415496	353	500758	352	458127
368	431923	371	518649	370	475286
386	447355	389	535314	388	491335
404	461983	407	550963	406	506473
422	475892	425	565771	424	520831
440	489008	443	579697	442	534353
458	501395	461	592880	460	547138
476	513086	479	605259	478	559172
494	524216	497	616940	496	570578
512	534822	515	627911	514	581367
530	544775	533	638174	532	591474
548	554131	551	647849	550	600990
566	563089	569	657006	568	610047
584	571670	587	665606	586	618638
602	579830	605	673660	604	626745
620	587524	623	681270	622	634397

Table B - 1. Continued

Average HD Permeation					
Time (min)	M_f, Palm (ng/cm^2)	Time (min)	M_f, Cuff (ng/cm^2)	Average Time (min)	Average M_f (ng/cm^2)
638	594760	641	688394	640	641577
656	601662	659	695108	658	648385
674	608127	677	701510	676	654819
692	614276	695	707643	694	660960
710	620318	713	713335	712	666827
728	626063	731	718647	730	672355
746	631394	749	723740	748	677567
764	636466	767	728615	766	682541
782	641307	785	733315	784	687311
800	645891	803	737722	802	691807
818	650299	821	741905	820	696102
837	654523	840	745934	838	700228
855	658576	858	750019	856	704298
873	662479	876	753893	874	708186
891	666171	894	757323	892	711747
909	669685	912	760603	910	715144
927	673040	930	763720	929	718380
945	676238	948	766723	947	721480
963	679294	966	769575	965	724435
981	682202	984	772265	983	727233
999	684990	1002	774869	1001	729930
1018	687704	1021	777394	1019	732549
1036	690330	1039	779938	1037	735134
1054	692854	1057	782381	1055	737618
1072	695249	1075	784589	1073	739919
1090	697538	1093	786685	1091	742112
1108	699764	1111	788711	1110	744238
1126	701877	1129	790658	1128	746268
1144	703910	1147	792537	1146	748224
1162	705899	1165	794355	1164	750127
1180	707802	1183	796082	1182	751942
1199	709626	1202	797743	1200	753685
1217	711381	1220	799350	1218	755365
1235	713060	1238	800873	1236	756967
1253	714668	1256	802350	1254	758509

Note 1: Because the first reported average M_f was above the threshold criteria, the physiologically derived breakthrough time was estimated by assuming that the permeation was linear between time 0 and 10 min.

Table B - 2.

Average GB Permeation					
Time (min)	M_f, Palm (ng/cm^2)	Time (min)	M_f, Cuff (ng/cm^2)	Average Time (min)	Average M_f (ng/cm^2)
11	5247	6	3186	9	4217
26	19906	21	17660	24	18783
41	34606	36	32129	39	33367
56	49344	51	46645	54	47994
71	64025	66	59747	69	61886
86	78465	81	72637	84	75551
101	92172	96	86337	99	89254
116	104789	111	98906	114	101848
131	116314	126	109706	129	113010
146	126532	141	118601	144	122567
161	135277	156	125828	159	130552
176	142636	171	131706	174	137171
191	148814	186	136549	189	142681
206	154023	201	140527	204	147275
221	158382	216	143800	219	151091
236	162044	231	146113	234	154079
251	165139	246	148018	249	156579
266	167774	261	150012	264	158893
281	170029	276	151732	279	160880
296	171972	291	153235	294	162603
311	173663	306	154554	309	164109
326	175142	321	155725	324	165433
341	176441	336	156773	339	166607
356	177595	351	157711	354	167653
371	178624	366	158562	369	168593
386	179548	381	159338	384	169443
401	180379	396	160044	399	170211
416	181126	411	160692	414	170909
431	181814	426	161290	429	171552
446	182450	441	161845	444	172147
461	183033	456	162362	459	172697
476	183568	471	162844	474	173206
491	184061	486	163293	489	173677
506	184520	501	163712	504	174116
521	184947	516	164104	519	174525
536	185343	531	164471	534	174907
551	185712	546	164818	549	175265
566	186060	561	165146	564	175603
581	186387	576	165457	579	175922
596	186695	591	165751	594	176223

Table B - 2. Continued

Average GB Permeation					
Time (min)	M_f, Palm (ng/cm^2)	Time (min)	M_f, Cuff (ng/cm^2)	Average Time (min)	Average M_f (ng/cm^2)
611	186986	606	166031	609	176508
626	187260	621	166296	624	176778
641	187519	636	166548	639	177034
656	187767	651	166790	654	177278
671	188004	666	167022	669	177513
686	188231	681	167244	684	177738
701	188449	696	167457	699	177953
716	188658	711	167663	714	178160
731	188859	726	167860	729	178360
746	189052	741	168051	744	178552
761	189239	756	168235	759	178737
776	189418	771	168414	774	178916
791	189591	786	168586	789	179088
806	189758	801	168752	804	179255
821	189919	816	168913	819	179416
836	190076	831	169070	834	179573
851	190229	846	169221	849	179725
866	190375	861	169368	864	179871
881	190517	876	169511	879	180014
896	190654	891	169649	894	180151
911	190786	906	169783	909	180285
926	190914	921	169914	924	180414
941	191039	936	170042	939	180540
956	191160	951	170165	954	180662
971	191279	966	170283	969	180781
986	191394	981	170399	984	180897
1001	191505	996	170513	999	181009
1016	191614	1011	170625	1014	181120
1031	191721	1026	170735	1029	181228
1046	191823	1041	170841	1044	181332
1061	191922	1056	170944	1059	181433
1076	192020	1071	171044	1074	181532
1091	192114	1086	171141	1089	181627
1106	192206	1101	171236	1104	181721
1121	192296	1116	171329	1119	181812
1136	192383	1131	171419	1134	181901
1151	192469	1146	171507	1149	181988
1166	192552	1161	171594	1164	182073
1181	192633	1176	171678	1179	182155

Table B - 2. Continued

Average GB Permeation					
Time (min)	M_f, Palm (ng/cm^2)	Time (min)	M_f, Cuff (ng/cm^2)	Average Time (min)	Average M_f (ng/cm^2)
1196	192713	1191	171761	1194	182237
1211	192791	1206	171842	1209	182316
1226	192866	1221	171921	1224	182394
1241	192940	1236	171997	1239	182469
1256	193011	1251	172073	1254	182542
1271	193082	1266	172147	1269	182614
1286	193150	1281	172218	1284	182684
1301	193218	1296	172288	1299	182753
1316	193283	1311	172357	1314	182820
1331	193347	1326	172425	1329	182886
1346	193409	1341	172490	1344	182950
1361	193470	1356	172555	1359	183012
1376	193529	1371	172618	1374	183074
1391	193588	1386	172679	1389	183133
1406	193645	1401	172740	1404	183192
1421	193700	1416	172799	1419	183250
1436	193755	1431	172858	1434	183307

Table B - 3.

Individual HD Swatch Data											
M_f, Cumulative Permeation (ng/cm^2), 23 April 03											
Time (min)	1 Palm	Time (min)	2 Cuff	Time (min)	3 Palm	Time (min)	4 Cuff	Time (min)	5 Palm	Time (min)	6 Cuff
2	591	5	1074	8	1869	11	8484	14	4943	17	6779
20	13863	23	11214	26	11779	29	38834	32	19588	35	22372
38	32961	41	26499	44	25437	47	74510	50	38272	53	41234
56	54948	59	45614	62	43031	65	113627	68	59919	71	63575
74	79022	77	67102	80	63045	83	155347	86	84190	89	87341
92	104082	95	90168	98	85222	101	197644	104	109691	107	111598
110	129034	113	114895	116	109129	119	239428	122	135096	125	137689
128	154205	131	140455	134	133637	137	281751	140	161240	143	164486
146	179299	149	166095	152	159075	155	323063	158	187449	161	190743
164	203930	167	192153	170	184987	173	362519	176	213345	179	216202
182	228009	185	218116	188	211126	191	400650	194	238805	197	241086
200	251249	203	242885	206	236697	209	437586	212	263161	215	265834
218	273576	221	266425	224	261379	227	473010	230	286500	233	289725
236	294955	239	289423	242	285596	245	506995	248	308323	251	312014
254	315515	257	311521	260	309635	263	539197	266	328968	269	333503
272	335288	275	332721	278	333245	281	569511	284	349168	287	353938
290	353982	293	353581	296	356227	299	598209	302	368593	305	373059
308	371495	311	373447	314	378442	317	624781	320	388922	323	389356
326	387672	329	391911	332	399204	335	649512	338	408163	341	404284
344	402936	347	409609	350	419048	353	672816	356	424504	359	419848
362	417670	365	426523	368	438130	371	694989	374	439970	377	434434
380	431651	383	442277	386	456231	389	715455	392	454184	395	448211
398	445210	401	457130	404	473551	407	734584	410	467187	413	461174
416	458018	419	471390	422	490150	425	752608	428	479508	431	473315
434	469728	437	484965	440	506055	443	769573	446	491242	449	484553
452	480994	455	498030	458	520957	461	785437	464	502235	467	495172
470	491831	473	510550	476	534817	479	800040	482	512610	485	505187
488	501931	491	522603	494	548169	497	813600	500	522548	503	514616
506	511429	509	534089	512	561168	515	826159	518	531869	521	523486
524	520275	527	544839	530	573557	533	837931	536	540493	539	531752
542	528617	545	555126	548	585184	551	848840	554	548593	557	539581
560	536907	563	564804	566	596109	569	859171	572	556250	575	547043
578	544877	581	573914	584	606699	587	868950	590	563435	593	553954
596	552239	599	582632	602	617066	605	878008	608	570186	611	560341
614	559217	617	591008	620	626791	623	886500	626	576565	629	566302
632	565889	635	598853	638	635824	641	894422	644	582568	647	571908
650	572221	653	606123	656	644565	659	901969	662	588200	665	577231
668	578106	671	613203	674	652783	677	909082	680	593492	683	582246
686	583735	689	620215	692	660546	695	915785	698	598546	701	586930
704	589558	707	626728	710	668127	713	921969	716	603270	719	591308

Table B - 3. Continued

Individual HD Swatch Data											
M_f, Cumulative Permeation (ng/cm^2), 23 April 03											
Time (min)	1 Palm	Time (min)	2 Cuff	Time (min)	3 Palm	Time (min)	4 Cuff	Time (min)	5 Palm	Time (min)	6 Cuff
722	595085	725	632808	728	675403	731	927678	734	607700	737	595456
740	599974	743	638630	746	682211	749	933205	752	611997	755	599384
758	604684	761	644255	764	688609	767	938484	770	616107	773	603105
776	609119	779	649703	782	694826	785	943567	788	619977	791	606676
794	613219	797	654837	800	700836	803	948291	806	623619	809	610038
812	617248	815	659791	818	706581	821	952736	824	627068	827	613187
830	621200	833	664536	837	712121	840	957044	843	630247	846	616222
849	624922	852	669080	855	717552	858	961150	861	633254	864	619827
867	628406	870	673425	873	722778	876	964981	879	636252	882	623274
885	631725	888	677492	891	727699	894	968567	897	639090	900	625912
903	634977	906	681381	909	732361	912	971986	915	641717	918	628442
921	638049	924	685125	927	736850	930	975213	933	644223	936	630821
939	640986	942	688730	945	741081	948	978366	951	646647	954	633073
957	643778	960	692153	963	745120	966	981403	969	648985	972	635169
975	646371	978	695394	981	749053	984	984253	987	651181	990	637146
993	648877	996	698547	999	752822	1002	986992	1005	653272	1008	639067
1011	651337	1014	701634	1018	756465	1021	989610	1024	655309	1027	640938
1030	653740	1033	705003	1036	759955	1039	992085	1042	657294	1045	642725
1048	656035	1051	708217	1054	763325	1057	994484	1060	659202	1063	644442
1066	658176	1069	710901	1072	766570	1075	996810	1078	661002	1081	646057
1084	660201	1087	713453	1090	769675	1093	999023	1096	662738	1099	647580
1102	662183	1105	715942	1108	772676	1111	1001133	1114	664434	1117	649059
1120	664097	1123	718345	1126	775507	1129	1003160	1132	666028	1135	650470
1138	665958	1141	720638	1144	778233	1147	1005137	1150	667540	1153	651837
1156	667766	1159	722882	1162	780930	1165	1007039	1168	668999	1171	653144
1174	669480	1177	725050	1180	783512	1183	1008823	1186	670415	1189	654372
1192	671101	1195	727135	1199	785986	1202	1010524	1205	671791	1208	655571
1211	672668	1214	729142	1217	788373	1220	1012178	1223	673102	1226	656729
1229	674173	1232	731047	1235	790652	1238	1013754	1241	674356	1244	657819
1247	675626	1250	732898	1253	792838	1256	1015280	1259	675540	1262	658872

Table B - 4.

Individual GB Swatch Data											
M_f, Cumulative Permeation (ng/cm^2), 8 May 03											
Time (min)	1 Cuff	Time (min)	2 Palm	Time (min)	3 Cuff	Time (min)	4 Cuff	Time (min)	5 Palm	Time (min)	6 Palm
2	1057	5	2285	7	3597	10	4903	12	5955	15	7502
17	14891	20	16457	22	18265	25	19824	27	20508	30	22753
32	28825	35	30559	37	32832	40	34731	42	35132	45	38125
47	42799	50	44703	52	47427	55	49710	57	49771	60	53557
62	56759	65	58846	67	57778	70	64704	72	64224	75	69005
77	70652	80	72976	82	67765	85	79494	87	77967	90	84452
92	84222	95	87008	97	81097	100	93690	102	89877	105	99630
107	97024	110	100689	112	92707	115	106987	117	99453	120	114225
122	108362	125	113705	127	102192	130	118565	132	107101	135	128135
137	117819	140	125626	142	109936	145	128050	147	113156	150	140814
152	125575	155	136056	157	116151	160	135759	162	117927	165	151847
167	131885	170	144907	172	121159	175	142075	177	121674	180	161325
182	137009	185	152391	187	125282	190	147356	192	124675	195	169375
197	141189	200	158719	202	128694	205	151698	207	127139	210	176210
212	144606	215	163977	217	131523	220	155270	222	129173	225	181996
227	147441	230	168377	232	133923	235	156974	237	130861	240	186895
242	149813	245	172092	247	135965	250	158278	252	132287	255	191037
257	151826	260	175235	262	137701	265	160507	267	133536	270	194553
272	153564	275	177890	277	139216	280	162415	282	134637	285	197561
287	155067	290	180161	292	140556	295	164081	297	135598	300	200156
302	156378	305	182143	307	141739	310	165545	312	136449	315	202398
317	157532	320	183873	322	142798	325	166844	327	137213	330	204339
332	158561	335	185395	337	143754	340	168003	342	137902	345	206027
347	159475	350	186747	352	144620	355	169038	357	138530	360	207507
362	160299	365	187956	367	145408	370	169979	372	139098	375	208817
377	161052	380	189045	382	146124	385	170839	387	139616	390	209983
392	161732	395	190021	397	146779	400	171621	402	140091	405	211024
407	162351	410	190893	412	147387	415	172338	417	140515	420	211972
422	162914	425	191694	427	147954	430	173001	432	140908	435	212840
437	163439	440	192434	442	148481	445	173615	447	141287	450	213629
452	163932	455	193113	457	148970	460	174184	462	141640	465	214346
467	164389	470	193735	472	149428	475	174716	477	141969	480	214999
482	164811	485	194310	487	149857	490	175210	492	142275	495	215598
497	165205	500	194848	502	150258	505	175672	507	142563	510	216149
512	165571	515	195350	517	150633	520	176107	522	142833	525	216657
527	165914	530	195816	532	150984	535	176514	537	143087	540	217126
542	166240	545	196250	547	151315	550	176898	552	143323	555	217562
557	166547	560	196658	562	151630	565	177261	567	143548	570	217972

Table B - 4. Continued

Individual GB Swatch Data											
M_f, Cumulative Permeation (ng/cm^2), 8 May 03											
Time (min)	1 Cuff	Time (min)	2 Palm	Time (min)	3 Cuff	Time (min)	4 Cuff	Time (min)	5 Palm	Time (min)	6 Palm
572	166837	575	197043	577	151929	580	177606	582	143761	585	218357
587	167110	590	197407	592	152211	595	177932	597	143963	600	218715
602	167370	605	197750	607	152479	610	178242	612	144154	615	219053
617	167617	620	198073	622	152735	625	178537	627	144336	630	219371
632	167851	635	198378	637	152977	640	178818	642	144508	645	219672
647	168074	650	198669	652	153208	655	179087	657	144673	660	219959
662	168289	665	198949	667	153432	670	179343	672	144830	675	220232
677	168496	680	199219	682	153647	685	179588	687	144982	690	220493
692	168695	695	199477	697	153851	700	179826	702	145128	705	220744
707	168888	710	199723	712	154047	715	180053	717	145268	720	220983
722	169075	725	199959	727	154236	730	180269	732	145403	735	221215
737	169254	740	200186	742	154420	745	180478	747	145533	750	221438
752	169428	755	200406	757	154600	760	180678	762	145660	765	221651
767	169597	770	200616	772	154772	775	180873	777	145782	780	221857
782	169758	785	200818	787	154938	790	181062	792	145900	795	222055
797	169913	800	201014	802	155099	805	181244	807	146014	810	222246
812	170064	815	201202	817	155255	820	181419	822	146125	825	222430
827	170209	830	201390	832	155409	835	181591	837	146232	840	222607
842	170350	845	201573	847	155558	850	181756	852	146334	855	222778
857	170488	860	201746	862	155699	865	181917	867	146434	870	222944
872	170622	875	201914	877	155837	880	182074	882	146530	885	223105
887	170751	890	202078	892	155972	895	182225	897	146624	900	223260
902	170876	905	202234	907	156103	910	182372	912	146714	915	223409
917	170997	920	202387	922	156230	925	182515	927	146802	930	223554
932	171117	935	202535	937	156354	940	182655	942	146887	945	223694
947	171232	950	202679	952	156474	955	182788	957	146971	960	223831
962	171343	965	202819	967	156590	970	182917	972	147052	975	223966
977	171452	980	202955	982	156703	985	183043	987	147130	990	224097
992	171556	995	203088	997	156815	1000	183168	1002	147206	1005	224222
1007	171659	1010	203218	1012	156927	1015	183290	1017	147280	1020	224345
1022	171762	1025	203343	1027	157033	1030	183409	1032	147353	1035	224466
1037	171862	1040	203466	1042	157136	1045	183525	1047	147422	1050	224581
1052	171959	1055	203585	1057	157237	1060	183636	1062	147490	1065	224693
1067	172052	1070	203701	1072	157335	1075	183744	1077	147557	1080	224802
1082	172143	1085	203814	1087	157430	1090	183849	1092	147621	1095	224908
1097	172231	1100	203924	1102	157523	1105	183954	1107	147684	1110	225011
1112	172318	1115	204032	1117	157613	1120	184055	1122	147745	1125	225111
1127	172403	1130	204137	1132	157702	1135	184152	1137	147804	1140	225209

Table B - 4. Continued

Individual GB Swatch Data											
M_f, Cumulative Permeation (ng/cm^2), 8 May 03											
Time (min)	1 Cuff	Time (min)	2 Palm	Time (min)	3 Cuff	Time (min)	4 Cuff	Time (min)	5 Palm	Time (min)	6 Palm
1142	172485	1145	204239	1147	157788	1150	184248	1152	147862	1155	225305
1157	172566	1160	204339	1162	157874	1165	184342	1167	147920	1170	225397
1172	172645	1175	204436	1177	157958	1180	184432	1182	147976	1185	225486
1187	172721	1190	204533	1192	158039	1195	184521	1197	148030	1200	225575
1202	172797	1205	204629	1207	158118	1210	184610	1212	148082	1215	225662
1217	172871	1220	204720	1222	158196	1225	184695	1227	148134	1230	225745
1232	172943	1235	204810	1237	158272	1240	184778	1242	148184	1245	225825
1247	173015	1250	204897	1252	158346	1255	184858	1257	148232	1260	225904
1262	173084	1265	204984	1267	158420	1270	184936	1272	148280	1275	225981
1277	173151	1280	205069	1282	158491	1285	185012	1287	148326	1290	226056
1292	173218	1295	205151	1297	158560	1300	185087	1302	148373	1305	226129
1307	173283	1310	205231	1312	158628	1315	185161	1317	148418	1320	226201
1322	173346	1325	205309	1327	158695	1330	185233	1332	148460	1335	226270
1337	173408	1340	205387	1342	158761	1345	185302	1347	148502	1350	226338
1352	173469	1355	205462	1357	158825	1360	185370	1362	148544	1365	226404
1367	173528	1370	205535	1372	158889	1375	185437	1377	148584	1380	226469
1382	173586	1385	205607	1387	158950	1390	185502	1392	148623	1395	226533
1397	173643	1400	205678	1402	159011	1405	185565	1407	148662	1410	226595
1412	173700	1415	205747	1417	159072	1420	185627	1422	148699	1425	226655
1427	173755	1430	205815	1432	159131	1435	185688	1437	148735	1440	226715

Table B - 5.

Duraclean® with Lycra® Glove Swatches – HD Trial Run					
M_f, Cumulative Permeation (ng/cm^2), 22 April 03					
Time (min)	1 Cuff	Time (min)	2 Palm	Time (min)	3 Palm
1	117	4	693	7	1729
10	4978	13	4892	16	7489
19	11750	22	10207	25	14847
28	19549	31	16408	34	23615
37	27759	40	23380	43	33949
46	36638	49	30921	52	45459
55	46450	58	39031	61	58213
64	56846	67	47622	70	71826
73	67650	76	56628	79	85887
82	78721	85	65920	88	100391
91	90151	94	75500	97	115603
100	102187	103	85541	106	131395
109	114311	112	95593	115	146942
118	126373	121	105802	124	162623
127	138705				

Table B - 6.

HD Silicone Swatch Trial for Duraclean® with Lycra® Glove											
Mf, Cumulative Permeation (ng/cm^2), 21 April 03											
Time (min)	Swatch 1	Time (min)	Swatch 2	Time (min)	Swatch 3	Time (min)	Swatch 4	Time (min)	Swatch 5	Time (min)	Swatch 6
2	0	5	0	8	0	11	0	14	0	18	0
21	0	24	0	27	0	30	0	33	0	36	0
39	0	42	0	45	0	48	0	51	0	54	0
57	0	60	0	63	0	66	0	69	0	72	0
75	0	78	0	81	291	84	311	87	0	90	0
93	299	96	244	99	981	102	1032	105	292	108	269
111	977	114	785	117	1912	120	1911	123	920	126	538
129	1795	132	1457	135	3054	138	2919	141	1681	144	815
147	2738	150	2251	153	4317	156	4073	159	2575	162	1405
165	3768	168	3145	171	5689	174	5360	177	3572	180	2084
183	4889	186	4142	189	7382	192	6756	195	4668	199	2844
202	6094	205	5216	208	9102	211	8257	214	5864	217	3675
220	7341	223	6354	226	10586	229	9871	232	7140	235	4587
238	8639	241	7524	244	12063	247	11553	250	8451	253	5529
256	9975	259	8686	262	13557	265	13257	268	9771	271	6495
274	11290	277	9868	280	15069	283	14969	286	11092	289	7513
292	12568	295	11078	298	16840	301	16692	304	12427	307	8548
310	13855	313	12289	316	18590	319	18411	322	13787	325	9589
328	15150	331	13490	334	20056	337	20119	340	15150	343	10650
346	16433	349	14673	352	21506	355	21821	358	16482	361	11723
364	17691	367	15854	370	22947	373	23545	376	17824	380	13024
383	18966	386	17036	389	24379	392	25280	395	19139	398	14313
401	20224	404	18236	407	25783	410	26949	413	20412	416	15352
419	21453	422	19458	425	27161	428	28564	431	21698	434	16369
437	22692	440	20672	443	28519	446	30187	449	22986	452	17384
455	23921	458	21861	461	29847	464	31830	467	24248	470	18414
473	25129	476	23020	479	31169	482	33442	485	25482	488	19458
491	26320	494	24187	497	32475	500	35026	503	26700	506	20484
509	27497	512	25367	515	33763	518	36579	521	27915	524	21500
527	28648	530	26518	533	35059	536	38117	539	29153	542	22495
545	29766	548	27662	551	36327	554	39655	557	30351	561	23460
564	30857	567	28784	570	37576	573	41175	576	31503	579	24422
582	31946	585	29850	588	38830	591	42686	594	32666	597	25603
600	33033	603	30890	606	40047	609	44187	612	33843	615	26765
618	34091	621	31909	624	41235	627	46008	630	34975	633	27686
636	35129	639	32938	642	42408	645	47806	648	36090	651	28695
654	36175	657	33995	660	43551	663	49241	666	37218	669	29704
672	37204	675	35049	678	44723	681	50623	684	38329	687	30613

Table B - 6. Continued.

HD Silicone Swatch Trial for Duraclean® with Lycra® Glove											
Mf, Cumulative Permeation (ng/cm^2), 21 April 03											
Time (min)	Swatch 1	Time (min)	Swatch 2	Time (min)	Swatch 3	Time (min)	Swatch 4	Time (min)	Swatch 5	Time (min)	Swatch 6
690	38194	693	36063	696	45873	699	51971	702	39427	705	31516
708	39164	711	37051	714	46954	717	53312	720	40491	723	32411
726	40118	729	38025	732	48002	735	54648	738	41545	742	33291
745	41052	748	39021	751	49031	754	55972	757	42592	760	34154
763	41977	766	40001	769	50051	772	57253	775	43592	778	35012
781	42897	784	40926	787	51061	790	58514	793	44573	796	35874
799	43805	802	41834	805	52048	808	59746	811	45567	814	36718
817	44684	820	42728	823	52998	826	60947	829	46534	832	37525
835	45543	838	43610	841	53918	844	62158	847	47484	850	38300
853	46387	856	44461	859	54820	862	63367	865	48429	868	39083
871	47228	874	45298	877	55719	880	64536	883	49357	886	39876
889	48081	892	46140	895	56609	898	65670	901	50264	904	40646
907	48914	910	46985	913	57475	916	66776	919	51145	923	41394
926	49706	929	47819	932	58320	935	67871	938	52019	941	42137
944	50484	947	48629	950	59164	953	68952	956	52870	959	42855
962	51261	965	49420	968	59989	971	70022	974	53700	977	43560
980	52009	983	50216	986	60809	989	71111	992	54543	995	44271
998	52735	1001	50989	1004	61619	1007	72163	1010	55390	1013	44972
1016	53448	1019	51734	1022	62379	1025	73174	1028	56215	1031	45666
1034	54137	1037	52461	1040	63119	1043	74197	1046	57029	1049	46348
1052	54810	1055	53166	1058	63850	1061	75204	1064	57827	1067	47023
1070	55471	1073	53869	1076	64574	1079	76173	1082	58602	1085	47684
1088	56126	1091	54577	1094	65271	1097	77105	1100	59364	1104	48331
1107	56782	1110	55277	1113	65954	1116	78022	1119	60095	1122	48957
1125	57415	1128	55945	1131	66633	1134	78943	1137	60811	1140	49558

In all M_f tables, zero (0) is equivalent to non-detectable (ND).

Table B - 7.

GB Silicone Swatch Trial for Duraclean® with Lycra® Glove											
Mf, Cumulative Permeation (ng/cm^2), 7 May 03											
Time (min)	Swatch 1	Time (min)	Swatch 2	Time (min)	Swatch 3	Time (min)	Swatch 4	Time (min)	Swatch 5	Time (min)	Swatch 6
2	3	5	6	7	12	10	0	12	0	15	0
17	38	20	39	22	52	25	0	27	0	30	0
32	49	35	50	37	80	40	0	42	0	45	0
47	60	50	50	52	92	55	0	57	0	60	0
62	99	65	64	67	108	70	0	72	0	75	0
77	174	80	102	82	148	85	13	87	11	90	0
92	281	95	159	97	204	100	49	102	39	105	0
107	407	110	233	112	272	115	101	117	78	120	15
122	546	125	319	127	350	130	168	132	127	135	47
137	693	140	415	142	436	145	246	147	184	150	87
152	845	155	519	157	527	160	332	162	246	165	131
167	1001	170	626	172	622	175	423	177	312	180	178
182	1160	185	737	187	719	190	520	192	381	195	229
197	1318	200	850	202	818	205	621	207	454	210	282
212	1474	215	964	217	919	220	725	222	530	225	336
227	1629	230	1080	232	1021	235	832	237	606	240	391
242	1782	245	1195	247	1123	250	941	252	685	255	448
257	1934	260	1312	262	1226	265	1051	267	764	270	506
272	2085	275	1429	277	1330	280	1162	282	843	285	565
287	2233	290	1545	292	1434	295	1275	297	923	300	625
302	2379	305	1662	307	1541	310	1390	312	1004	315	685
317	2524	320	1779	322	1648	325	1508	327	1086	330	747
332	2669	335	1896	337	1757	340	1629	342	1171	345	811
347	2816	350	2014	352	1867	355	1753	357	1257	360	877
362	2963	365	2134	367	1981	370	1880	372	1346	375	944
377	3113	380	2256	382	2096	385	2010	387	1436	390	1013
392	3263	395	2379	397	2213	400	2142	402	1528	405	1083
407	3413	410	2502	412	2332	415	2278	417	1622	420	1156
422	3563	425	2626	427	2454	430	2417	432	1718	435	1230
437	3713	440	2750	442	2577	445	2557	447	1816	450	1304
452	3865	455	2876	457	2703	460	2699	462	1914	465	1380
467	4018	470	3003	472	2831	475	2843	477	2013	480	1458
482	4170	485	3131	487	2959	490	2989	492	2113	495	1537
497	4320	500	3256	502	3089	505	3137	507	2216	510	1617
512	4470	515	3382	517	3219	520	3287	522	2318	525	1698
527	4621	530	3509	532	3350	535	3438	537	2420	540	1781
542	4773	545	3637	547	3485	550	3590	552	2525	555	1864
557	4926	560	3767	562	3622	565	3743	567	2630	570	1950

Table B - 7. Continued

GB Silicone Swatch Trial for Duraclean® with Lycra® Glove											
Mf, Cumulative Permeation (ng/cm^2), 7 May 03											
Time (min)	Swatch 1	Time (min)	Swatch 2	Time (min)	Swatch 3	Time (min)	Swatch 4	Time (min)	Swatch 5	Time (min)	Swatch 6
572	5078	575	3896	577	3762	580	3899	582	2737	585	2036
587	5228	590	4024	592	3901	595	4056	597	2845	600	2122
602	5380	605	4151	607	4039	610	4213	612	2953	615	2210
617	5530	620	4277	622	4178	625	4368	627	3060	630	2298
632	5681	635	4403	637	4317	640	4524	642	3167	645	2388
647	5830	650	4530	652	4458	655	4684	657	3275	660	2478
662	5978	665	4656	667	4599	670	4843	672	3385	675	2570
677	6126	680	4719	682	4741	685	5004	687	3495	690	2663
692	6276	695	4781	697	4882	700	5165	702	3605	705	2758
707	6427	710	4907	712	5025	715	5324	717	3715	720	2854
722	6576	725	5033	727	5168	730	5484	732	3827	735	2950
737	6724	740	5158	742	5312	745	5646	747	3940	750	3046
752	6871	755	5281	757	5456	760	5808	762	4053	765	3144
767	7019	770	5405	772	5600	775	5970	777	4167	780	3243
782	7168	785	5529	787	5746	790	6132	792	4282	795	3343
797	7318	800	5654	802	5892	805	6296	807	4397	810	3445
812	7468	815	5781	817	6040	820	6460	822	4515	825	3548
827	7618	830	5906	832	6189	835	6626	837	4633	840	3652
842	7768	845	6031	847	6336	850	6794	852	4752	855	3758
857	7919	860	6156	862	6484	865	6961	867	4871	870	3866
872	8071	875	6280	877	6633	880	7129	882	4991	885	3974
887	8222	890	6406	892	6783	895	7297	897	5111	900	4082
902	8372	905	6531	907	6935	910	7466	912	5233	915	4191
917	8522	920	6656	922	7087	925	7636	927	5356	930	4302
932	8672	935	6785	937	7239	940	7809	942	5480	945	4414
947	8824	950	6914	952	7392	955	7982	957	5605	960	4527
962	8977	965	7040	968	7544	970	8154	973	5730	975	4643
978	9129	980	7165	983	7696	985	8325	988	5856	990	4759
993	9282	995	7290	998	7849	1000	8498	1003	5982	1005	4874
1008	9435	1010	7416	1013	8001	1015	8671	1018	6111	1020	4989
1023	9589	1025	7542	1028	8152	1030	8843	1033	6241	1035	5104
1038	9742	1041	7667	1043	8303	1046	9016	1048	6370	1051	5221
1053	9894	1056	7794	1058	8454	1061	9188	1063	6497	1066	5337
1068	10046	1071	7921	1073	8604	1076	9359	1078	6624	1081	5453
1083	10195	1086	8046	1088	8756	1091	9531	1093	6749	1096	5569
1098	10344	1101	8170	1103	8911	1106	9703	1108	6876	1111	5686
1113	10497	1116	8295	1119	9065	1121	9875	1124	7004	1126	5804
1129	10649	1131	8419	1134	9216	1136	10046	1139	7131	1141	5923

Table B - 7. Continued

GB Silicone Swatch Trial for Duraclean® with Lycra® Glove											
Mf, Cumulative Permeation (ng/cm^2), 7 May 03											
Time (min)	Swatch 1	Time (min)	Swatch 2	Time (min)	Swatch 3	Time (min)	Swatch 4	Time (min)	Swatch 5	Time (min)	Swatch 6
1144	10800	1146	8545	1149	9368	1151	10218	1154	7258	1156	6041
1159	10952	1161	8671	1164	9520	1166	10389	1169	7387	1171	6160
1174	11104	1176	8798	1179	9676	1181	10560	1184	7517	1186	6279
1189	11256	1192	8925	1194	9831	1197	10732	1199	7649	1202	6399
1204	11407	1207	9052	1209	9981	1212	10905	1214	7781	1217	6520
1219	11559	1222	9177	1224	10130	1227	11074	1229	7912	1232	6642
1234	11713	1237	9302	1239	10279	1242	11244	1244	8044	1247	6762
1249	11865	1252	9427	1254	10430	1257	11413	1259	8172	1262	6882
1264	12013	1267	9554	1270	10581	1272	11583	1275	8300	1277	7002
1280	12162	1282	9679	1285	10733	1287	11753	1290	8429	1292	7122
1295	12310	1297	9803	1300	10882	1302	11924	1305	8558	1307	7244
1310	12458	1312	9929	1315	11034	1317	12095	1320	8689	1322	7365
1325	12606	1327	10056	1330	11185	1332	12263	1335	8818	1337	7487
1340	12756	1343	10179	1345	11334	1348	12431	1350	8946	1353	7608
1355	12906	1358	10305	1360	11484	1363	12599	1365	9074	1368	7729
1370	13055	1373	10429	1375	11631	1378	12765	1380	9201	1383	7851
1385	13202	1388	10551	1390	11777	1393	12932	1395	9330	1398	7971
1400	13347	1403	10675	1405	11925	1408	13101	1410	9459	1413	8093
1415	13493	1418	10798	1421	12070	1423	13268	1426	9588	1428	8215
1431	13638	1433	10919	1436	12216	1438	13434				

In all M_f tables, zero (0) is equivalent to non-detectable (ND).

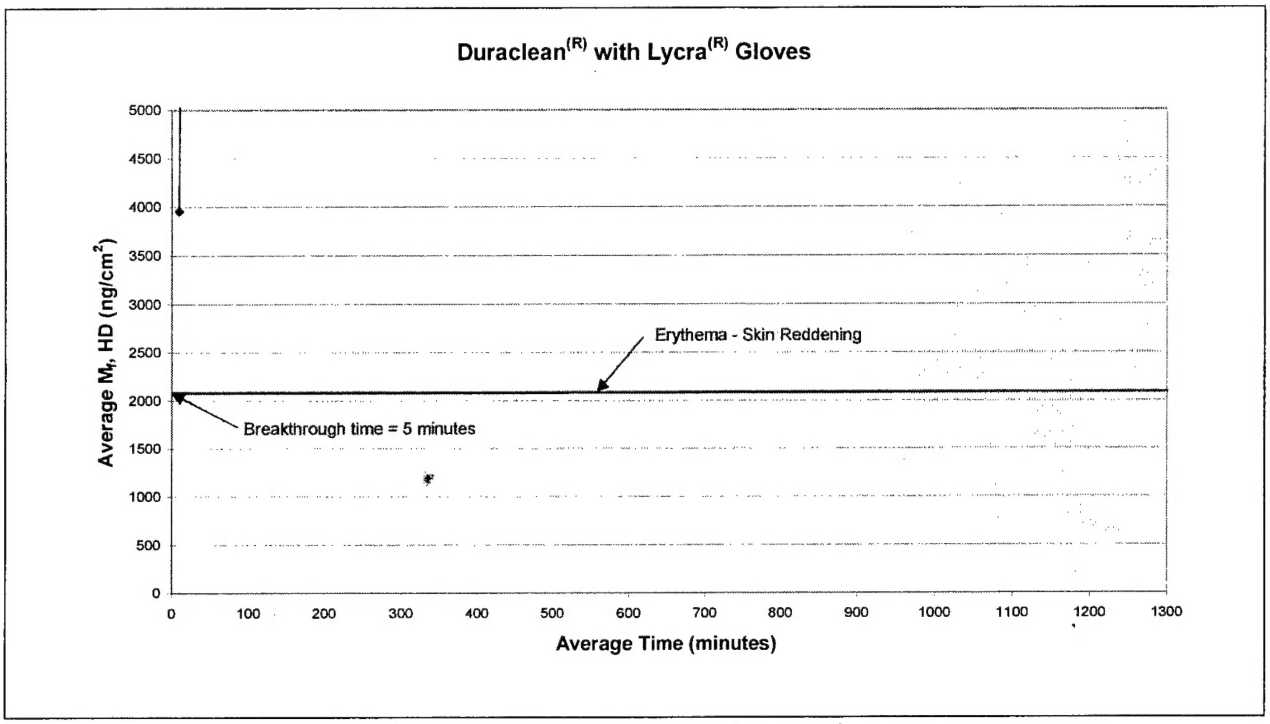

Figure B - 1. Average HD Permeation

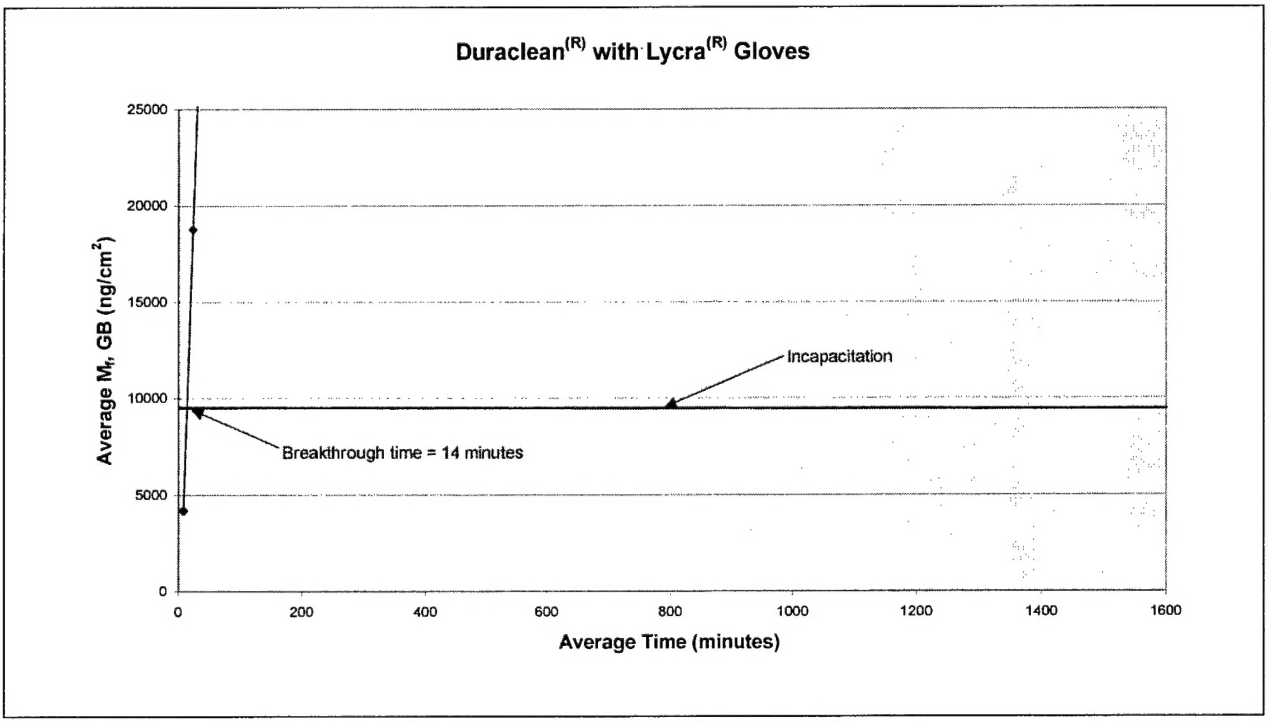

Figure B - 2. Average GB Permeation

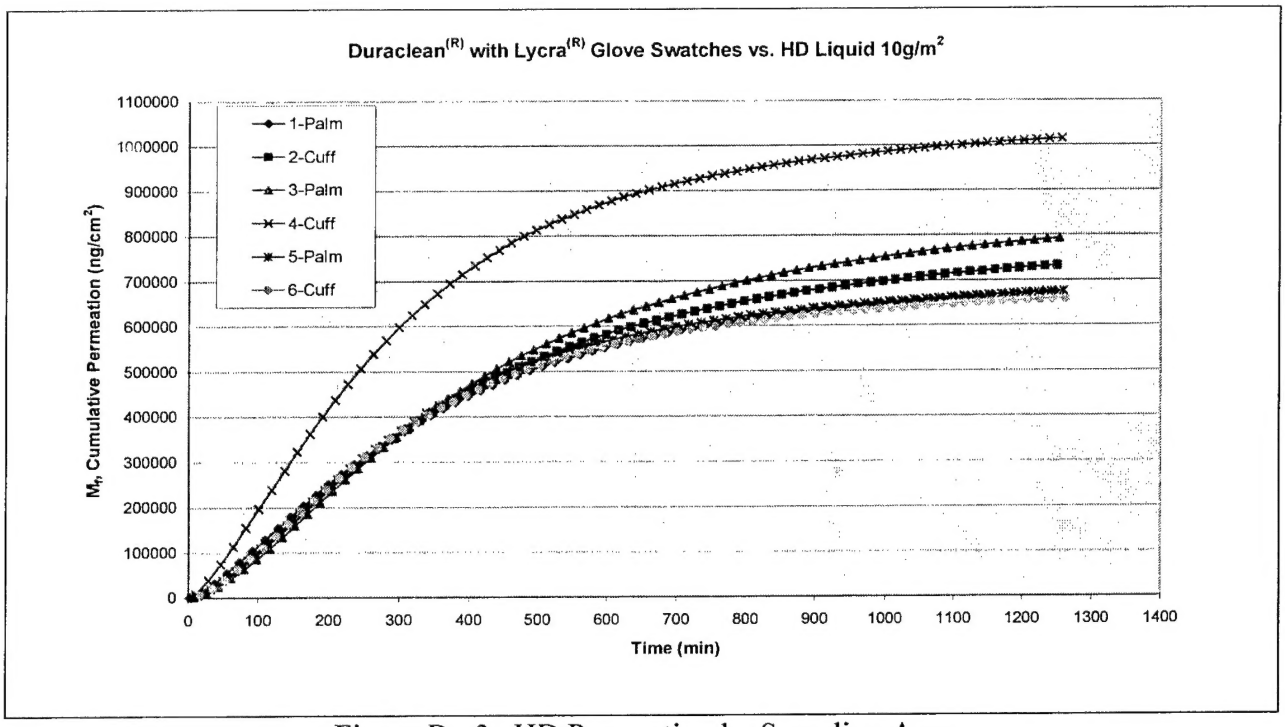

Figure B - 3. HD Permeation by Sampling Area

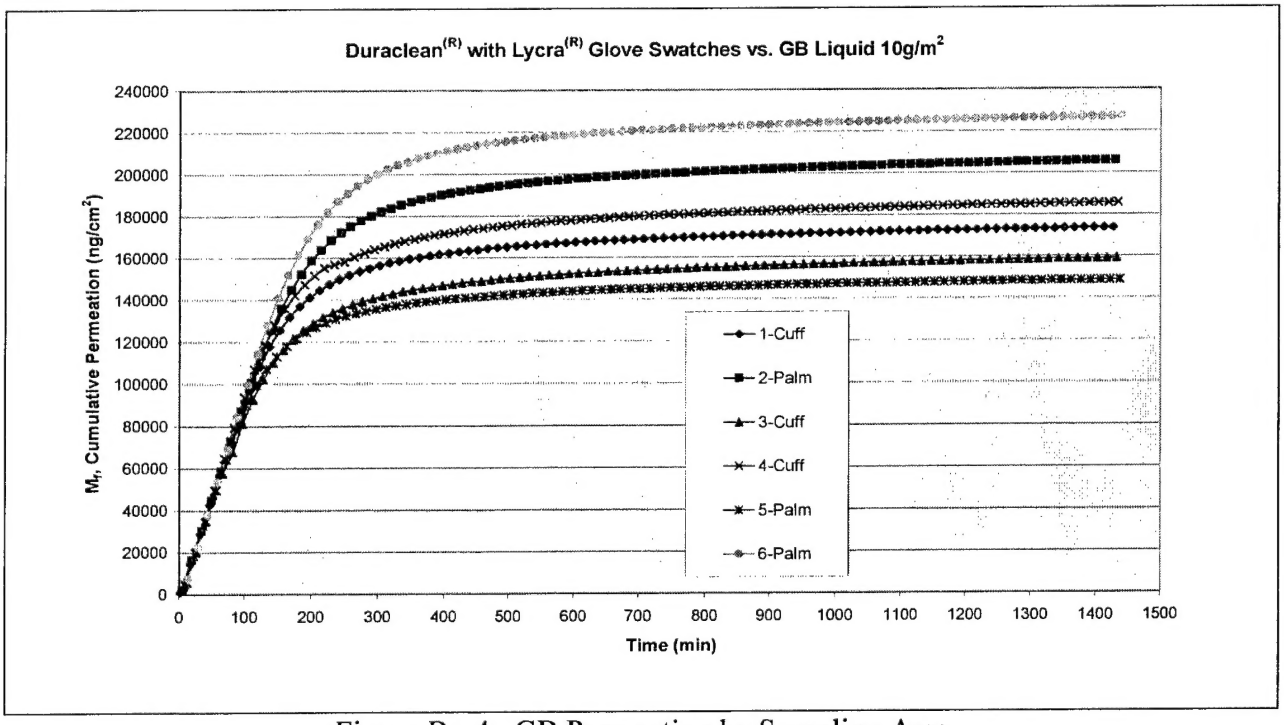

Figure B - 4. GB Permeation by Sampling Area